Developmental Biology 331 (2009) 388–389

Contents lists available at ScienceDirect

Developmental Biology

journal homepage: www.elsevier.com/developmentalbiology

Abstracts

Concurrent session 2: Developmental neurobiology

Program/Abstract # 11
The evolution of chemosensory perception in insects
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The detection of environmental cues is critical for insects to find relevant food sources, potential mates, and suitable oviposition sites. The species-related information carried by chemical cues is perceived and processed through the chemosensory system. Recent data from our group and others in the field show that insects have acquired an evolutionarily distinct olfactory system, that although anatomically homologous to that in vertebrates, uses novel structural and molecular mechanisms to detect odors. This presentation will cover the latest comparative data on the development and function of chemosensory systems in insects compared to vertebrates.

doi:10.1016/j.ydbio.2009.05.017

Program/Abstract # 12
Id2 is essential for regulating growth and patterning of the vertebrate retina
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While much is known about the neuronal organization of the retina and the temporal sequence of neurogenesis, the intrinsic cellular and molecular mechanisms mediating these processes remain elusive. The Inhibitor of Differentiation (Id) family of proteins inhibits differentiation in multiple cell contexts, presumably by keeping cells in a proliferative, stem cell-like state. Although previous studies have described Id2 expression in the retina, its function during retinal development has not been well characterized. Using morpholino knockdown, we show that reduction of Id2 protein leads to microphthalmia and defects in neuronal differentiation within the retina. Id2 loss of function (LOF) retinas contain ganglion cells, but all other differentiated retinal neuron subtypes are absent. While retinal specification markers are expressed normally, the expression of retinal differentiation transcription factors is diminished in Id2 LOF retinas, suggesting that Id2 function is required downstream of cell fate specification and prior to terminal differentiation. While apoptosis is not increased in Id2 LOF retinas, cell cycle analyses using flow cytometry and BrdU incorporation assays reveals that cells in Id2 LOF retinas remain in the S phase of the cell cycle, suggesting that microphthalmia in Id2 LOF embryos results from an inability to progress through the cell cycle. Interestingly, overexpression of Id2 leads to increased eye size with no effect on retinal differentiation or patterning. Taken together, these observations support a model where Id2 regulates both cell cycle progression and retinal differentiation to influence retinal growth and development.

doi:10.1016/j.ydbio.2009.05.018

Program/Abstract # 13
Function of microRNA during neuromuscular junction development
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Abstract #13 will be presented as scheduled, but will not be published due to lack of license agreement between authors and publisher.

doi:10.1016/j.ydbio.2009.05.019

Program/Abstract # 14
Feedback regulation of neurogenesis
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Generation of appropriate numbers of neurons and glia during development of the nervous system requires the correct balance between maintaining neural progenitors versus the differentiation of cells. This balance is regulated by a network of activators and inhibitors. Within regions of active neurogenesis, the amount of cell differentiation is limited by widely expressed inhibitors and by short-range lateral inhibition. In specific parts of the vertebrate nervous system, neurogenesis is also regulated by large scale patterning mechanisms that generate distinct neurogenic and non-neurogenic zones. We will discuss two novel feedback mechanisms that regulate different aspects of neuronal differentiation. First, we have investigated how non-neurogenic zones are generated in segment centres in the zebrafish hindbrain, confining neurogenesis to zones adjacent to boundaries. We show that this spatial patterning of neurogenesis is achieved by signalling from specific early-generated neurons to progenitor cells. A second feedback mechanism has been found in studies of primary